



ANALYSIS OF THE EFFECT OF INFORMATION AND COMMUNICATIONS INFRASTRUCTURE ON FOREIGN DIRECT INVESTMENT IN EMERGING MARKET COUNTRIES

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ABSTRACT

This study examines the effect of information and communication technology infrastructure on foreign direct investment in 20 emerging market economies. In the 90s, developing countries had policies to make it easier for investors. Emerging markets countries are significant and potential markets. There is data that emerging market countries have increased from 35.90% to contributing 46.62% of FDI of the world's total in 2019. Using 25 years of data (1995-2019), use the panel data regression method to see the influence of ICT infrastructure on FDI. Find strong empirical evidence showing that the influence of ICT infrastructure on FDI is significantly positive in emerging market economies. In addition, we also examine the relationship between the variables GDP, inflation, and Trade openness to FDI. GDP, and Trade openness have significant positive results for FDI, while inflation has significant negative results for FDI in emerging market economies.

Keywords: Information and Communication Technology Infrastructure, Foreign direct investment, Emerging market economies, Panel Data

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ABSTRAK

Penelitian ini bertujuan untuk menguji pengaruh infrastruktur teknologi informasi dan komunikasi terhadap investasi asing langsung di 20 ekonomi pasar berkembang. Pada tahun 90-an negara berkembang memiliki kebijakan untuk memudahkan investor. Negara-negara emerging market merupakan pasar yang besar dan potensial, ada data negara-negara emerging market mengalami peningkatan dari 35,90% memberikan kontribusi 46,62% dari total FDI dunia pada tahun 2019. Menggunakan data dengan 25 tahun (1995-2019), menggunakan regresi data panel metode untuk melihat pengaruh infrastruktur TIK terhadap FDI. Temukan bukti empiris yang kuat yang menunjukkan bahwa pengaruh infrastruktur TIK terhadap FDI secara signifikan positif di ekonomi pasar berkembang. Selain itu, kami juga menguji hubungan variabel GDP, inflasi, dan Trade openness terhadap FDI. GDP dan Trade openness memiliki hasil positif yang signifikan untuk FDI, sementara inflasi memiliki hasil negatif yang signifikan untuk FDI di negara berkembang ekonomi.

Kata Kunci: Infrastruktur Teknologi Informasi dan Komunikasi, Asing investasi langsung, Ekonomi pasar berkembang, Data Panel.

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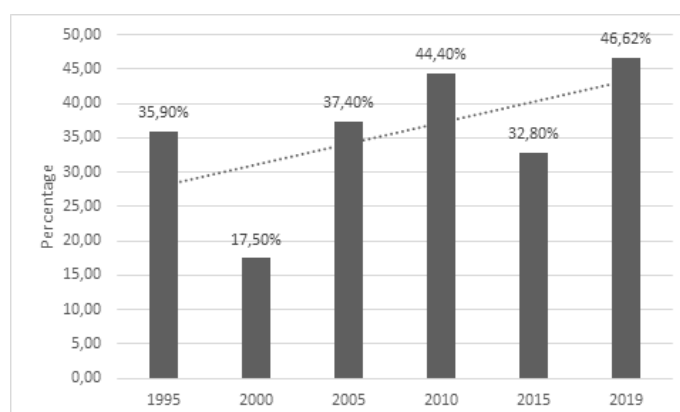


Introduction

Foreign direct investment (FDI) is the international capital flow of a company from a country that expands the company to other countries. Especially for developing countries, this type of investment is needed to support a country's economic growth (Adiyudawansyah & Santoso, 2012). Direct investment, such as FDI is preferred because it is long-term and stable (Ruth & Syofyan, 2014). In general, most governments believe that foreign direct investment or FDI contributes to economic growth in a country. Countries in the world have started to make long-term FDI investments. In 1990 emerging market countries. FDI is used as a source of long-term funds, as well as making policies that make it easier for investors to invest in emerging market countries (Lipsey, 2001).

Most emerging markets are characterized by a young population and a growing middle class. Also, emerging market countries are experiencing some change like industrialization, modernization, and rapid economic growth. Emerging market have different classifications. According to the FTSE (Financial Times Stock Exchange Group), Russell Group as an institution that presents financial and economic data, classifies it into four parts: developed, advanced emerging, secondary emerging and frontier. They are characterized by rapid economic growth but their infrastructure and household incomes have not caught up. Emerging market countries have a tendency to increase economic growth driven by a younger population, higher consumption levels, modernization of infrastructure, and integration with the global economy. Examples of emerging market countries are Brazil, Malaysia, Indonesia, Russia, China, and 19 other countries.

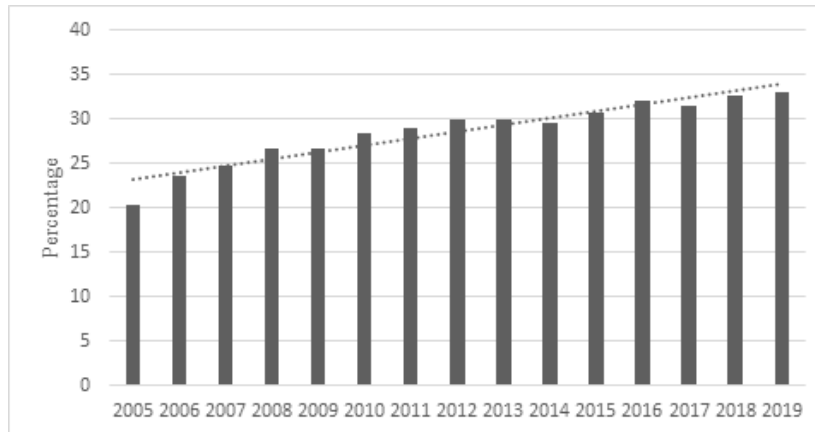
Emerging market countries have a significant contribution to Global FDI. In the last decade, emerging market countries have made policies regarding economic openness to attract the attention of investors to invest. The FDI chart shows a positive trend and has the highest percentage in 2019, 46.62%, an increase of about 1.3 times from 1995. Hence, the data proves that the economic openness policies of emerging market countries have been successful. FDI also serves to bring technology from the country of origin to the recipient country, one of which is technology development (Appleyard & Field, 2014). According to research by Wangpenzi & Bangash (2021), easy access to good information technology such as telephone lines, internet, and cellular users can trigger investors to invest. The impact will increase productivity levels and attract FDI inflows to the country. In addition, other studies also found that the development of information and communication technology infrastructure can attract foreign investment in the market. The return of FDI inflows from the communications sector has positive and significant results in emerging market countries (Suh & Bae, 2002).



Source: UNCTAD (2022)

Figure 1: FDI Emerging Market Economies

The development of the information and communication technology sector in emerging market countries has increased every year. Emerging market countries have a positive trend every year. The increase occurred during 2005-2019 where in 2005, it had a percentage of 20.38 % and 2019 had a percentage of 33.08%, an increase of about 1.65 times from 2005. This provides evidence that emerging market countries have positive results in the international exchange sector in terms of services, value, shares and growth of information and communication technology.



Source: UNCTAD (2022)

Figure 1: Growth of International Trade ICT Emerging market

Many economic theories state that foreign direct investment is an influential indicator in encouraging economic growth. According to Sukirno (2006), foreign direct investment is a form of international capital flow from other countries to expand and increase companies in other countries. Direct investment not only uses state resources as a target but also participates in investment supervision.

Ease of access is something that encourages large-scale use of technology. Advances in information and communication technology (ICT) disseminate various information on a global scale, allowing developing countries to adopt technologies from developed countries. The impact of the advancement of ICT is an increase in productivity and faster economic growth. The information-based economy that has recently developed over the last few decades has been associated with increased ICT diffusion, which is expected to contribute to higher productivity gains and better economic growth. Technology becomes an independent variable to attract FDI into the country. Technological diffusion in FDI has become an important tool in investment.

The study by Contractor et al. (2020) found that the policies of world countries affect the investment decisions of multinational companies taken from a long-term perspective. In this study, it was found that the strength of a country, namely the enforcement of contracts and the ease of cross-border trade, becomes a very strong consideration for multinational enterprises (MNEs). MNE carries out a diffusion process in emerging countries that have superior technology and management efficiency. Implementation of the system in the destination country is a form of long-term investment by multinational companies. This is also positive because it can trigger faster Gross Domestic Product (GDP) growth in a country (Sinha & Sen-gupta, 2019).

According to Dimelis & Papaioannou (2010), the ICT-based economy that has just been developed over the last 25 years has increased FDI inflows and has been able to encourage

economic growth in developing countries. In addition, ICT can also affect FDI inflows indirectly by influencing other determinant variables such as the ease of access to information and the use of technology. With the influence of other determinants, it will stimulate innovation and new business. In addition, advanced ICT infrastructure also has positive results in the trade sector by attracting FDI inflows from goods and services businesses.

The improvement of ICT infrastructure also makes it possible to catch up with the nation's development by diffusion of technology or adopting technology originating from developed countries, where technology diffusion has an important role in economic growth as well as increasing productivity and efficiency. Advanced ICT infrastructure is also able to provide logistical support for trade activities and is also able to increase the attractiveness of the country for investors from abroad. The increasingly comprehensive use of the internet allows the host community to increase the transparency of various activities, with transparency being able to eliminate several factors that hinder FDI inflows (Sinha & Sengupta, 2019).

Research from Addison & Rahma (2005) suggests that countries with a successful implementation of new economic policies on ICTs may be able to overcome barriers that have long held them back from contributing to global trade. For example, barriers to remote geographic restrictions and an unfavorable climate. The possibility to access commercial and political information that was previously unavailable also opened up by rapid spread of the internet. In particular, the advancement of ICT has reduced many transaction costs for participating in business sub-contracting (Matambalya & Wolf, 2001).

Literature Review

Foreign Direct Investment

Krugman et al. (2012) said that foreign direct investment (FDI) is an international flow of capital sourced from companies from one country to establish or expand their companies to other countries. What is prominent in FDI involves not only the transfer of resources but also having control of foreign companies. Foreign direct investment involves moving or expanding foreign companies to the country and enabling higher wages for the workforce. It is a significant source of transfer of technology and management skills invested by foreign direct investment.

In the theoretical literature by Carbaugh (2019), Foreign direct investment is a flow of foreign capital in which an international or multinational company expands or establishes its own company and has control in another country. For example, when a foreign company purchases more than 10 percent of a domestic company or when a foreign company builds a new production facility domestically, the investment is considered an FDI inflow. On the other hand, investment by domestic companies facilitated by production from abroad is considered an FDI outflow. Building new production facilities overseas is referred to as greenfield FDI. Buying shares of more than 10 percent of a foreign company is called brownfield FDI or cross-border mergers and acquisitions. Therefore, FDI is an international flow of capital where a company in a country establishes or expands its company to another country (Krugman et al., 2012).

According to Samuelson & Nordhaus (2009), an investment will encourage additional income for the company if a company is able to operate fully and produce a lot of output. Then output or GDP has an important role that will determine investment. When the factory is not operating, the company has relatively little need for new plants, so investment is low. In

general, investment depends on the income to be obtained by the overall economic activity. Multinational companies are a form of FDI, where production takes place at factories located in two or more countries but under the general supervision and direction of headquarters located in one country. Multinational companies operate in many host countries. Multinational corporations often conduct research and development activities in addition to manufacturing, mining, extraction, and business service operations. Multinational corporations' cross-national borders and are often routed from corporate planning centers far from the host country. Both share ownership and management of the company are multinational (Carbaugh, 2019)

According to Dunning (1993), a country must have advantages to attract investment such as low production costs, large available markets, abundant resources such as natural resources and low-skilled and skilled labor, and some barriers such as the low level of trade and economic openness within a country. On the other hand, inflation has a negative impact on investment. According to Samuelson & Nordhaus (2009), the inflation rate has a negative effect on investment because high inflation rates will increase risk in long-term investment, high inflation rates can reduce the average maturity of capital loans and will cause distortion of information about relative prices. In addition, investment is also an important component in economic development. Acceleration of economic growth such as capital accumulation, population, and advances in technology, in this case as an important factor in improving and multiplying the quality of physical resources and human resources (Todaro & Smith, 2003).

The Eclectic Paradigm

In theory proposed by Dunning (1993), Dunning combines three different FDI theories: ownership advantage, location, and internalization, abbreviated as OLI theory. The theory identifies and evaluates the factors that influence foreign companies' production and affect the country's development. This theory develops and provides the point of view of a country rather than a company. There is a basic research expectation on the investment development cycle, if a country tries to get investment from the country or foreign companies, the country will carry out investment activities and look at the economic growth of the destination country, the structure of supporting factors and markets of the destination country, and the economic and political system of the destination country. Then, how likely a market failure occurs in cross-border product intermediary transactions (Dunning, 1993)

The eclectic paradigm distinguishes between the effects on international business (IB) activities related to the ownership advantage (O) or foreign origin of the firms involved in IB, the internalization (I) of cross-border markets that affect the boundaries of the MNE multinational enterprise, and the location characteristics of the host (L) where the IB activity is located. In other words, the eclectic paradigm is basically about how to properly combine the problems of network-derived and home-country-derived capabilities (O), transaction costs (I), and the resources, capabilities, and institutions of location as the host production site. (L) Dunning (1993).

Dunning (1993) in the eclectic theory of FDI, he explains the determinants of FDI in the OLI framework. Says that a country must have one of three advantages to attract FDI. First, companies must have an ownership advantage that allows them to compete efficiently in the local market, in this case a company's production process, the company's competitive advantage over domestic companies, and also includes patents, copyrights, technical knowledge and management skills. Second, the host country must have several location advantages that encourage outside firms to serve the local market directly rather than going for export. For example, lower production and transportation costs, favorable tax treatment, lower risk, and ac-

cess to protected markets. Finally, companies must have sufficient incentives to serve foreign companies through internal networks, for example, lower transaction costs, minimum technology imitation, effective management and good quality control. [Dunning \(1993\)](#) states that the advantages of this OLI can vary depending on whether the countries are underdeveloped or fully developed, large or small, whether the industry is labor intensive or capital intensive, whether the market is developing or mature, competitive or monopolistic. ([Dunning, 1993](#)).

According to Dunning, there are four types of FDI: market-seeking FDI, resource-seeking FDI, efficiency-seeking FDI and strategic asset-seeking FDI. Market-seeking FDI aims to penetrate the host country's local market and is usually linked to per capita income and market size, market growth, access to regional and global markets, consumer preferences and domestic market structure. Resource-seeking FDI seeks and secures natural resources, for example, raw materials, lower unit labor costs, unskilled labor and skilled labor pools, physical infrastructure (ports, roads, electricity, and telecommunications), and technology levels. Efficiency-seeking FDI is motivated by creating competitive resources for firms and going where production costs are lower than before. Finally, strategic asset-seeking FDI aims to advance the company's global or regional strategy into foreign networks of created assets such as technology, organizational capabilities and markets ([Faeth, 2009](#)).

Previous Research

Previous research by [Wangpengzi & Bangash \(2021\)](#) using data from 1997-2018 in D8 countries (Bangladesh, Indonesia, Iran, Malaysia, Egypt, Nigeria, Pakistan, and Turkey). The research method used is Ordinary Least Square. The results of this study indicate a positive and significant effect between ICT infrastructure and FDI inflows, followed by other control variables such as market size, and trade openness. In terms of macroeconomic variables, the exchange rate has a negative effect. In this study, FDI is an important element that causes economic globalization and economic development because adopting FDI is stated to be the best building element for developing countries.

Previous research by [Rehman et al. \(2011\)](#) used data from 1995-2002 in Pakistan. This study uses the Auto Regressive Distributed Lag or ARDL method. The study's results indicate that infrastructure development strongly attracts foreign direct investment, whether in the short or the long term, in the case of Pakistan. Poor infrastructure can increase transaction costs and limit access to local and global markets, hindering FDI in developing countries. In emerging market countries, infrastructure has two roles: promoting FDI and providing a greater return on investment to multinational business owners.

Previous research by [Ko \(2007\)](#) used classification data from developing countries (middle- and low-income groups) and developed countries (high-income groups), according to the World Bank. This study uses the Generalized Method of Moments. The study's results provide strong evidence that the impact of a negative internet network in developing countries inhibits FDI entry. Conversely, the impact of a positive internet network in developed countries has more FDI income, but in this study, MNCs have no influence on internet investment and foreign production.

Previous research by [Asghar & Hussain \(2014\)](#) used data from 90 developing countries in 1980-2007. This study uses the Ordinary Least Square method. The results of the study found that the market size, and population has a significant positive effect on inward FDI. The results show that a large domestic market followed by economic growth and liberalization has a strong positive effect. Macroeconomic instability prevents foreign investors from mak-

ing investments. This study found that the geographical regional and lingual characteristics of developing countries influence the investment decisions of multinational companies. In Sub-Saharan Africa, English as the lingua franca of global trade has a positive effect on multinational corporations. In contrast, countries such as France have negative results, perhaps because of the large number of francophone North African countries (MENA). Spanish and Portuguese-speaking countries had a positive but not significant effect; the same applies to the East Asia and Pacific region. The positive impact of infrastructure availability highlights the critical link between the provision of necessary infrastructure in the host country and investment inflows in developing countries.

Research methods

This research was conducted to complete the formulation of the problems that have been mentioned by using a quantitative approach. Testing hypotheses based on the analytical model used individually (t-test) and simultaneously (F-test) in order to see whether the analytical model was statistically significant. The analysis model test also determines the coefficient of determination (R²), which explains how much the independent variable can explain the dependent variable. The next stage of the analysis technique is to see if there are problems from the classical assumption test with the analytical model used, if there is no violation of the classical assumption, it can be concluded and the model from the analysis can be used. This study uses a panel data regression method.

This study uses secondary data in the form of panel data. The cross-section data used in this study include 20 emerging market economies, including Brazil, Chile, China, Colombia, Czech, Egypt, Greece, Hungary, India, Indonesia, Kuwait, Malaysia, Mexico, Pakistan, Qatar, Romania, Russia, South Africa, Thailand and Turkey. Emerging market economies are sourced from the FTSE Russell. The time period used in this study covers the years 1995-2019 (25 years) and the data sources used for this research were obtained from the World Bank and UNCTAD.

The model used to explain the basic framework for calculating the relationship between foreign direct investment, internet, GDP, consumer price index, and trade openness is based on multiple regression analysis. This method is used to determine the magnitude of the effect on changes in a variable to test the foreign direct investment model in emerging market countries. Data processing is carried out using the Stata 16 computer program. The dependent variable is foreign direct investment (Y). The independent variables are GDP (X1), Internet (X2), consumer price index (X3), and Trade openness (X4). Furthermore, it will be analyzed in the following way:

$$\ln FDI_{it} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 ITN_{it} + \beta_3 BRN_{it} + \beta_4 CPI_{it} + \beta_5 TO_{it} \quad (1)$$

Information:

FDI	= Foreign direct investment.
0	= Constant.
$\beta_1 \beta_2 \beta_3 \beta_4$	= Regression coefficient of each variable.
GDP	= Gross Domestic Product.
ITN	= internet.
BRN	= Broadband.
CPI	= Consumer Price Index.
TO	= Trade openness.
e	= Error term

According to [Gujarati \(2009\)](#), there are several methods that can be used for the estimation process using multiple regression analysis techniques. The first method, *pooled least square* (PLS), simply combines all time series data and cross-sectional data and then estimates using the ordinary least square (OLS) method. Second, by approaching the fixed effect model (FEM) method, that is, if the author faces the problem of committed variables, which may have an impact on changes in the intercept time series or cross-section. By adding a dummy variable to allow for changes to the intercept if the variable requires a dummy. Finally, the random effect model (REM) approach is used to improve efficiency in the least square process by calculating error, time series and cross-section.

Statistical Analysis and Test Techniques

PLS method according to [Gujarati \(2009\)](#) is a method that has a panel data estimation method using the *Ordinary Least Square* (OLS) method. This method combines the entire time series and cross-section data. This method takes into account the probability that the researcher will have a committed-variables problem, which may lead to changes in the intercept time series or cross section. FEM method according to [Gujarati \(2009\)](#) is the one used with panel data. This method has a way of adding a dummy to a variable that requires a dummy variable in the panel data, adding a dummy gives access to changes in the intercept.

REM method according to [Gujarati \(2009\)](#) is one of the methods used in panel data. This method has a way of calculating the error from the data by using the least square method. This method is an improvement from the least square method by calculating the error from the *time series* and *cross section data*. In the testing phase, it is necessary to select the best model using a panel data approach (PLS, FEM, REM). Restriction F test (Chow test) was used to determine the best model between PLS and FEM. Hausman test is used to determine the best model between FEM and REM. Lagrange test is used to determine the best model between PLS or REM [Gujarati \(2009\)](#).

Statistical tests were carried out on each model in each study period, using the following methods:

1. Coefficient of Determination

The coefficient of determination (R^2) indicates the ability of the independent variables to simultaneously explain the dependent variable. If the value of R^2 has an interval value of 0 to 1 ($0 < R^2 < 1$). If the R^2 value of the regression result is close to 1, then the data variation is near the regression line. Likewise, if the value of R^2 has a regression result close to 0, then the variation in the data is further away from the regression line ([Gujarati, 2009](#)).

2. F-statistical test (F-test)

The F-statistical test serves as a determinant of whether the *independent variable* has a simultaneous effect on the *dependent variable*. F-statistical test can be done by looking at the probability value (p-value test). If $F_{count} > F_{table}$ and p-value is significant, then reject H_0 and accept H_1 , then it shows that there is a relationship between the *independent* and *dependent variables* simultaneously (bivariate). If $F_{count} < F_{table}$ and p-value is not significant then accept H_0 and reject H_1 . This shows that there is no relationship between the *dependent* and *independent variables* in a bivariate or concurrent manner.

3. T-statistic test (t-test)

The t-statistical test is a hypothesis test on the regression coefficients in a partial manner which

is used to see the impact of each *independent variable* individually on the *dependent variable*. The t-statistical test is done by looking at the t-count on the regression results with the t-table. If the value of t-count is more than t-table and p-value is significant ($\alpha=5\%$) then reject H0 and accept H1. It shows that there is a relationship between the *dependent variable* and the *independent variable*, and vice versa if you reject the value of H1 then there is no relationship between the *dependent* and the *independent variable*.

Results and Discussion

Estimated Results

This study aims to analyze the effect of information and communication technology infrastructure on *foreign direct investment* in *emerging market economies* from 1995 to 2019. Following are the results of the regression:

Table 1 : Panel Data Regression Results

Independent Variable	Parameter	Estimation Model		
		PLS	FEM	BRAKE
Constant	0 _	-14.54002*** (1.075164)	-31.10876*** (3.234001)	-24.71713*** (2.577067)
Ln GDP	1 _	.9094023*** (0.0404375)	1.542984*** (.1223941)	1.299518*** (.0970447)
ITN	2 _	.0097125*** (.0018612)	.0086038*** (.0014856)	.01035*** (.0013838)
Ln BRN	3 _	.0662684 *** (.0085585)	.0340197 *** (.0060245)	.0395848 *** (.0058344)
CPI	4 _	-.0072722*** (.0024037)	-.0097399*** (.001595)	-.0094361*** (.0016027)
TO	5 _	.0040893*** (.001038)	.0054396*** (.0016375)	.0051256*** (.0015586)

Description: Data processed using Stata16

*) Stationary Significant Level 1%

This study uses foreign direct investment as the dependent variable, and the independent variables are internet users, broadband subscription, GDP, inflation and trade. The R-squared value is found in the PLS regression of 0.74 where this number is able to show that the variation of the independent variables which include internet broadband subscription users, GDP, Inflation and Trade is able to explain the dependent variable of foreign direct investment in 20 emerging market economies by 74%. FEM model R-squared value obtained is 0.69 where the variation of the independent variable in the FEM model is able to explain foreign direct investment by 69%. While the REM model with an R-squared value of 0.72 which indicates that the variation of the independent variable is able to explain foreign direct investment by 72%.

Based on the PLS, FEM, and REM models in table 1, it will then determine the best model of the three models. In selecting the model, three tests will be carried out, namely the Chow-test to choose the best method between PLS or FEM. If the selected result is FEM, then the second stage is the Hausman test. This test aims to select the best FEM or REM model, and the last stage is the Lagrange test which aims to find the best model between PLS and

REM. In table 2 it can be seen that the stationary variables at level (0) are QE Japan, QE US, Inflation, IR_Deposito, and Inport with a T-statistic value smaller than the alpha value. The other variables, namely lnGDP, lnNEER, and lnIHSG, have a T-statistic value greater than alpha, so that a level (1) differencing is performed on the data and the result is that the variable is stationary at level (1). Based on these results, the data used in this study is stationary at level (0) and level (1).

The selection of the first model analysis uses the Chow test to select the best estimation model between CEM and FEM. If the Prob>F value of the test is less than alpha ($\alpha = 5\%$), then the best estimation model that is temporarily selected is the FEM model. The selection of the second model for further analysis uses the Hausman test which is useful for finding the best estimation model between FEM and REM. If the Prob>chi2 value of the test is more than the alpha level ($\alpha = 5\%$), then the best estimation model is the REM model, so it is necessary to continue selecting the analytical model using the Lagrange multiplier test.

Table 2: t-test

Chow test		Hausman test		Lagrange Test	
H0=PLS		H0=REM		H0=PLS	
H1=FEM		H1=FEM		H1=REM	
Significance Level (α)	5%	Significance Level (α)	5%	Significance Level (α)	5%
Prob>F (PLS)	0.000	Prob>F (FEM)	0.069	Prob>F (PLS)	0.000

Description: Data processed using Stata16

Based on the two test results, it can be determined that the best estimation model used in this study is the REM estimation model. Because at the Chow test stage which is used to estimate between the PLS and FEM models, it shows that H1 is accepted, namely the FEM model, secondly, the Hausman test which is used to find the best model between FEM and REM shows that the test result number is more than alpha, so REM is selected as a temporary model, and finally continued with the Lagrange test and has less than alpha, it is concluded that the best model is the REM model.

Table 3: Selected Panel Data Regression Model F Test

<i>Independent Variable</i>	Dependent: Logarithmic FDI (REM)
C	-24.71713*** (2.577067)
GDP logs	1.299518*** (.0970447)
ITN	.01035*** (.0013838)
Broadband Log	.0395848 *** (.0058344)
CPI	-.0094361*** (.0016027)
TO	.0051256*** (.0015586)

Description: Data processed using Stata16

*) Stationary Significant Level 1%

Discussion

Influence of Information and Communication Technology Infrastructure on Foreign Direct Investment

Research studies on the influence of information and communication technology infrastructure on *foreign direct investment* have been discussed quite a lot in previous studies. However, this study specifically discusses the relationship between information and communication technology infrastructure and *foreign direct investment* in *emerging market economies*, which has never been discussed before. Information and communication technology infrastructure is represented by the variable of internet users acting as a mechanism capable of increasing *foreign direct investment* in *emerging market economies*. After going through the test using the REM method, the table above shows that the broadband subscription variable has a coefficient value of 0.039 with a probability value of 0.000 and internet users have a coefficient value of 0.01035 with a probability value of 0.000. Based on the test results, the two variables representing information and communication technology infrastructure have a positive and significant effect on *foreign direct investment* in *emerging market countries*. In other words, when there is an increase in information and communication technology infrastructure by 1 percent, it will increase *foreign direct investment* by 0.039, *ceteris paribus*.

Comparison with previous research tests conducted by [Wangpengzi & Bangash \(2021\)](#) is from the variables used. In this study, the variables of internet users, telephone subscriptions and mobile phone subscriptions were used as representative variables of ICT infrastructure, while in this study, the variables of internet users and fixed broadband subscriptions were used as renewals. Where both studies with infrastructure variables have significant positive results on the FDI variable. Not only that, the use of variables for market size also has differences where in previous studies using population variables but in this study using different variables, namely using the GDP variable as market size and both of them obtained significant positive results on FDI. The third difference is the use of variables for macro stability, where in previous studies using the exchange rate but in this study using the inflation variable and both variables have the same results which have a significant negative effect on FDI. Variable changes have been adapted to theory and as research updates.

In addition, positive results were also obtained in [Choi's \(2003\)](#) research which examined the influence of the internet in stimulating foreign direct investment in 14 source countries and 53 host countries. The results show that investors prefer countries that have fast internet infrastructure development, because with easy access it will also create convenience in global economic activities ([Choi, 2003](#) & [Meidayati, 2017](#)). In another study conducted by [Ko \(2007\)](#) stated that the positive results of information and communication technology infrastructure on foreign direct investment from developing countries have the benefit of attracting multinational companies to invest. This is an opportunity for underdeveloped countries, where these countries have obstacles to enter the global economic activity lane, because with the progress of good information and communication technology infrastructure will create a new ecosystem in a country with minimal costs is also an attraction. separately to invest.

Positive and significant results of information and communication technology infrastructure variables on foreign direct investment in emerging market countries is an opportunity for multinational companies to invest. One of the investments in the information and communication technology segment that can be done is in the field of e-commerce. In a journal published by the European research institute Euromonitor International, emerging market countries are suitable areas for multinational companies to develop e-commerce businesses.

The rapid growth of information and communication infrastructure is one of the strongest factors to attract investors. For example, China, which is an emerging market country, is now in the top position in e-commerce. China has Alibaba and Jd.com as well-known e-commerce companies, China's success is due to the ease of access for multinational companies to invest, and according to [Statista \(2021\)](#) China is expected to have a total profit of US\$3 trillion in 2024. In other emerging market countries also have the same results, where the improvement of information and communication technology infrastructure is also able to attract other companies such as Lazada, where the marketplace began operating in 2012 in the e-commerce world and has grown rapidly for 3 years. In 2015 Lazada sales reached US\$1,025 million. Lazada was purchased by Alibaba in early 2016 and has become one of the leading e-commerce platforms in emerging market countries such as Indonesia, Malaysia, the Philippines, Thailand and Vietnam. There are indicators of global strategy to encourage e-commerce companies such as the role of technology in a country's development.

The focus on increasing development reduces institutional, financial and logistical constraints as well as networking ([Wagner Mainardes et al., 2019](#)). Based on the estimation results of Qual VAR by looking at the impulse response function in Figures 4.7 and 4.8, Indonesia's GDP response to the QE and QQE shocks of the BoJ is positive at 0.045 percent. However, in the next period the BoJ's QE shock tends to have no response whatsoever to GDP in Indonesia. The results of this study are in line with researchers [McKinnon & Liu \(2013\)](#) who provide econometric evidence that Japan's economic growth has a positive impact on the economy of many developing Asian countries. However, in the case of Indonesia, it only occurred in the initial period. The easing of monetary policy carried out by the BoJ is only focused on the domestic goal of targeting stable output growth. The BoJ has no intention of achieving growth at the expense of neighboring Asian economies, so it is only natural that the BoJ's QE and QQE shocks do not have a negative effect on the Indonesian economy.

Meanwhile, in the second part of the QE *shock* by the Fed on GDP in Indonesia, GDP responded negatively by 0.1 percent in the first period. However, as time goes by, the negative response to GDP in Indonesia is decreasing until in the tenth period of QE the Fed does not have any impact on GDP in Indonesia. These results are in accordance with the research of [Bhattarai et al. \(2021\)](#) who said that there was no significant and strong effect on *output* in developing countries related to the QE shock by the Fed. Research by [Chari et al. \(2021\)](#) also said that the macroeconomic variable of GDP in developing countries tends to worsen during the QE period. QE causes capital inflows and exchange rate appreciation which indirectly has the opposite effect on production. When the inflow of capital is large enough and cannot be absorbed by the entire economy, there will be a trend of exchange rate appreciation exceeding the basic condition which is also supported by positive interest rate differences. This has an impact on the weakening of export competitiveness and leads to a decline in GDP ([Rive-ra-Batiz, 1986](#)).

Effect of Gross Domestic Product on Foreign Direct Investment

This study uses the variable Gross domestic product (GDP) as an indicator measuring market size. The expected research hypothesis on the GDP variable is that it has a positive effect on foreign direct investment, as in this study GDP acts as an appropriate mechanism to increase foreign direct investment in emerging market economies. After going through the test using the REM method, the table above shows that the Gross domestic product variable has a coefficient value of 1.299518 with a probability value of 0.000. Based on the test results, it can be interpreted that Gross domestic product has a positive and significant effect on foreign

direct investment in emerging market economies. In other words, when there is an increase in Gross domestic product by 1 percent, it will increase foreign direct investment by 1.299518 percent, *ceteris paribus*.

Comparison with the previous literature, namely in [Rehman's \(2011\)](#) research, the variable Gross domestic product as market size has a positive influence on the developing country of Pakistan, where these results have a positive influence on the long term in increasing foreign direct investment. In another study, [Kishor & Singh \(2015\)](#) also had positive results where GDP had a positive effect on FDI in BRICS countries (Brazil, Russia, India, China, South Africa). These countries are also included in emerging market economies, which in this study are also the countries studied. Research from [Azam & Haseeb \(2021\)](#) also has the same result, where GDP has a positive and two-way effect on FDI in Brazil, Russia, India, China, South Africa. In this study, GDP as a market size has a significant positive result on FDI. GDP is used as a reference for multinational companies as a country's productivity, where investors see it as a return on investment. Emerging market countries accounted for around 33.37 percent of total world GDP in 2019, this is a large number for a region.

Effect of Inflation on Foreign Direct Investment

This study uses the inflation variable from the consumer price index (CPI) as an indicator to measure macroeconomic stability. The expected research hypothesis on the inflation variable is that it has a negative effect on foreign direct investment in emerging market economies. After testing with the REM method, the table above shows that the inflation variable has a coefficient value of -0.0094361 with a probability value of 0.000. Based on the test results, it can be concluded that the inflation variable has a significant negative effect on foreign direct investment in emerging market economies. In other words, when the consumer price index increases by 1 percent, it will reduce foreign direct investment by -0.0094361, *ceteris paribus*.

Comparison of inflation from previous literature in the journal [Gupta & Singh \(2016\)](#) that has a negative influence on FDI in Brazil, Russia, India, China, South Africa. The same results were also obtained in the research of [Azam & Haseeb \(2021\)](#) where inflation also has a negative effect and has a two-way relationship to FDI in Brazil, Russia, India, China, South Africa. The results of the previous literature are in line with this study, where an increase in inflation will cause a decrease in FDI, because successive increases in inflation will reduce investor interest in investing. For example, if a multinational company wants to expand its market in a country experiencing a large increase in inflation, it will have an impact on increasing costs.

Effect of Trade openness on Foreign Direct Investment

Trade variable has a positive effect on foreign direct investment in emerging market economies. The test was carried out using the REM method, the table above shows that the trade variable has a coefficient value of 0.0081147 with a probability value of 0.000. Based on the test results, it can be concluded that the Trade variable has a significant positive effect on foreign direct investment in emerging market economies. In other words, when there is an increase in trade by 1 percent, it will increase foreign direct investment by 0.0081147 percent, *ceteris paribus*.

Comparison of the previous literature, namely from previous research by the journal [Gupta & Singh \(2016\)](#), where economic openness has a positive effect on FDI in Brazil, Russia, India, China, South Africa. This is because the country, which is also an emerging market economy, has a policy to attract FDI. Similar to research from [Azam & Haseeb \(2021\)](#) that eco-

conomic openness has a positive effect on FDI both long term and short term in Brazil, Russia, India, China, South Africa. Research from Hoang & Bui (2015) and Meidayati (2017) has the same result, namely that economic openness has a positive effect on FDI in ASEAN countries. These results have similarities with this study, where trade openness has positive results for emerging market countries. Economic openness is a policy used by emerging market countries in the 90s to attract investors to enter, because FDI is a long-term investment, and it is proven that this study has results as previous research and in accordance with the theory used, where trade openness has a significant positive effect. against FDI.

Conclusion

Based on the findings of the research that has been done, it can be concluded that the variable broadband & internet has a significant positive effect on foreign direct investment in emerging market economies. The Gross domestic product variable has a significant positive effect on foreign direct investment in emerging market economies. The inflation variable has a significant negative effect on foreign direct investment in emerging market economies. The Trade variable has a positive and significant effect on foreign direct investment in emerging market economies. The findings in this study as a whole have met the research hypothesis. Whereas information and communication technology infrastructure has a positive influence on emerging market economies. One of the positive results is that multinational companies invest in emerging market economies through e-commerce as a business tool

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